



The Office Guidelines Applied to Practice program improves secondary prevention of heart disease in Federally Qualified Healthcare Centers

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ABSTRACT

The burden of cardiovascular disease (CVD) among minority and low-income populations is well documented. This study aimed to assess the impact of patient activation and shared decision-making (SDM) on medication use through the Office-Guidelines Applied to Practice (Office-GAP) intervention in Federally Qualified Healthcare Centers (FQHCs).

Patients (243) with diabetes and CHD participated in Office-GAP between October 2010 and March 2014. Two-site (FQHCs) intervention/control design. Office-GAP integrates health literacy, communication skills education for patients and physicians, decision support tools, and SDM into routine care. Main measures: 1) implementation rates, 2) medication use at baseline, 3, 6, and 12 months, and 3) predictors of medication use. Logistic regression with propensity scoring assessed impact on medication use. Intervention arm had 120 and control arm had 123 patients. We found that program elements were consistently used. Compared to control, the Office-GAP program significantly improved medications use from baseline: ACEIs or ARBs at 3 months (OR 1.88, 95% CI = 1.07; 3.30, $p < 0.03$), 6 months (OR 2.68, 95% CI = 1.58; 4.54; $p < 0.01$); statin at 3 months (OR 2.00, 95% CI = 0.122; 3.27; $p < 0.05$), 6 months (OR 3.05, 95% CI = 1.72; 5.43; $p < 0.01$), Aspirin and/or clopidogrel at 3 months OR 1.59, 95% CI = 1.02, 2.48; $p < 0.05$), 6 months (OR 3.67, 95% CI = 1.67; 8.08; $p < 0.01$). Global medication adherence was predicted only by Office-GAP intervention presence and hypertension.

Office-GAP resulted in increased use of guideline-based medications for secondary CVD prevention in underserved populations. The Office-GAP program could serve as a model for implementing guideline-based care for other chronic diseases.

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1. Introduction

Disparities in cardiovascular health remain one of the most serious public health problems in the US today (Lillie-Blanton et al., 2004; Mensah, 2005). African-Americans, low-income and minority patients, especially those with diabetes suffer a disproportionate burden of cardiovascular diseases (CVD) morbidity and mortality (Wong et al., 2002). These differentials in CVD outcomes are thought to be partially attributable to disparities in CVD prevention and treatment and include barriers of literacy and poverty that obstruct access to benefits of secondary prevention. Anti-platelet agents, angiotensin-converting enzymes inhibitors (ACEIs), beta-blockers, and lipid-lowering agents

have significant morbidity and mortality benefits for prevention of CVD, but these agents are not optimally used (Chan et al., 2010). In general, 20–50% of patients are medication non-adherent (DiMatteo et al., 2002). Approximately 21–42% of patients with diabetes mellitus (DM) are medication non-adherent (Cramer, 2004; Kim et al., 2010). The lost opportunity for effective therapies to improve health is staggering (Bosworth et al., 2011; Ho et al., 2006). Medication non-adherence undermines treatment effectiveness resulting in poor diabetic and blood pressure (BP) control, and increasing hospitalization, mortality, and cost to the US healthcare system (Salas et al., 2009; Sokol et al., 2005). The concept of medication adherence is complex and multifaceted and needs to be considered within the context of patient, provider and system issues (Rolley et al., 2008).

Translating practice guidelines into clinical practice has proved very difficult and challenging, even when the guidelines are well accepted (Davis & Taylor-Vaisey, 1997). Behavioral change interventions have been shown to be effective in outpatient settings (Koertge et al., 2003;

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Vale et al., 2003). Patient and family engagement offers a promising pathway toward better quality health care and improved health outcomes (Carman et al., 2013). Physician and patient interventions designed in tandem to support the therapeutic partnership from both perspectives have been advocated but infrequently implemented (Roter & Larson, 2001). Only a few studies have simultaneously intervened with both patients and providers and objectively measured intervention effects on health outcomes (Griffin et al., 2004). ‘Patient activation’ describes skills and confidence that equip patients to become actively engaged in their healthcare (Hibbard et al., 2013). Some patient-activation interventions designed to improve patient-physician communication have been tested in patients with chronic diseases, but relatively few have used targeted strategies, and focused on ethnic minorities and low socio-economic populations (Cooper et al., 2011). In addition, patient pre-visit coaching has been shown to improve patients’ communication with their physicians and health outcomes. (Kaplan et al., 1989). A recent Cochrane review of decision aids (DAs) found high-quality evidence that DAs compared to usual care improve people’s knowledge regarding options, reduce their decisional conflict and stimulate people to take a more active role in decision making (Stacey et al., 2014).

Our study addresses the need for more research on the use of shared decision-making (SDM) and DAs, the translation of evidence-based decision support interventions and guidelines-based care into practice. We focus especially on community outpatient settings that serve minority low-income populations (Elwyn et al., 2013; Stacey et al., 2014). We previously developed an integrated SDM intervention (Holmes-Rovner et al., 2011) based on our research in patient and provider communication skills training (F. Dwamena et al., 2012; Smith et al., 2000) and provision of problem-specific decision support tools (DST) (Dwamena et al., 2008; Holmes-Rovner et al., 2000). In our prior research, primary care physicians participated in a communication and SDM skill training for patients with stable coronary artery disease (CAD) going for stress test (Kelly-Blake et al., 2015). In the present study, we used our intervention to encourage SDM in guidelines-based medication use among patients with either diabetes or coronary heart disease (CHD) or both, receiving care in Federally Qualified Health Centers (FQHCs). The Office-GAP Program (Fig. 1) is based on the Health Literacy Care Model (HLCM) (Koh et al., 2013) and the Relational Coordination Model (Gittel, 2006). The HLCM is a systems approach to improving patients’ engagement in care. Relational coordination refers to the quality of communication that strengthens interpersonal

relationships (Gittel, 2006; Havens et al., 2010). This is fundamental to collaborative goal setting that both patients and providers will embrace. The objectives of the Office-GAP Program evaluation were to determine: 1) feasibility of the Office-GAP program among patients with DM, CHD or both in two FQHCs in Michigan; 2) the impact on a) use of guidelines-based medication for CHD prevention and b) the predictors of medication use in FQHCs.

2. Methods

2.1. Study design and setting

A quasi-experimental design study, over 6 months, with 12-month follow-up in 2 FQHCs in mid-MI. Centers were assigned to either intervention or control by the toss of a coin. Patients were recruited from October 2010 to March 2014, using patient International Classification of Diseases (ICD)-9 Code. At patient visits where either DM or CHD or both were on the problem list, practice staff informed patients about the study and directed them to the research assistant (RA) for more information. Interested patients were scheduled for an Office-GAP program group visit.

2.1.1. Inclusion criteria

Adults aged 18 or older, who could provide informed consent. Patients with a diagnosis of DM, CHD or both.

2.1.2. Exclusion criteria

Cognitive impairment, dementia and psychosis as determined by ICD-9 codes. Interpreters were used for non-English speaking patients. Study participants received \$30 reimbursement for transportation and parking. The Michigan State University (MSU) Institutional Review Board (IRB) approved the study.

All providers at both FQHC facilities (6 doctors, 3 nurse-practitioners (NP)), 18 staff (Medical Assistants, Administrators, Receptionists, Social Workers), and 243 patients participated in this pilot study. All participants signed an informed consent.

2.2. Interventions

The Office-GAP tools were grounded in Guidelines of the American Heart Association/American College of Cardiology Foundation (AHA/ACCF) on secondary prevention of heart disease (Smith et al., 2011)

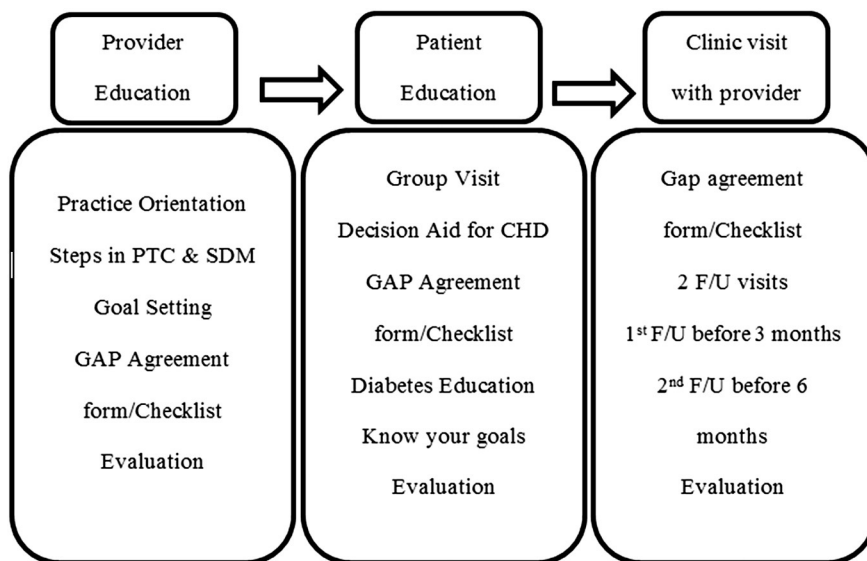


Fig. 1. Office-GAP intervention in Federally Qualified Healthcare Centers. GAP: Guidelines Applied to Practice PTC: patient-centered method of communication SDM: shared decision-making CHD: coronary heart disease F/U: follow up.

and those of the American Diabetes Association (ADA) (American Diabetes, 2010). The process, developed previously, (Holmes-Rovner et al., 2011) consisted of three Office-GAP components: 1) physician and practice staff training; 2) patient group visit; and 3) use of the Office-GAP checklist tool during follow-up provider visits. The checklist tool, (Supplementary Table A) aided SDM and communication between patient and provider. The checklist was stimulated by the Office-GAP hospital intervention in CAD by Eagle et al. (Mehta et al., 2002). It was adapted for primary care by a team member who is expert in DA development (MHR), with attention to plain language (Holmes-Rovner et al., 2005). Components were scripted and monitored to maintain study fidelity as shown in Fig. 1. (Office-GAP Intervention).

2.3. Physician and practice staff communication skills intervention

The physician communication intervention was a 90-min training offered at 4 different times to accommodate staff schedules. Training included a review of CHD secondary prevention guidelines and communication skills. Discussion of steps in the Patient-Centered Care Method of Communication (PTC) (Smith et al., 2000), SDM and goal setting, was led by PI (AO) and study team. The communication skills training goal was to increase patient engagement, activation, goal setting and empowerment. The intervention focused on strong provider-patient relationships as described in the HLCM (Koh et al., 2013) and Relational Coordination Model (Gittell, 2006). The research team, providers and practice staff identified possible opportunities and pitfalls of the study and discussed the best strategy for implementing the Office-GAP tools in the practice. Role-plays were conducted to model office visit skills. The training section was evaluated by surveying all participants at the end of the training.

2.4. Patient intervention

Patients attended one group visit to learn SDM, communication skills and reviewed DSTs similar to the skills and DSTs reviewed during physician intervention. We define DST to include the Office-GAP checklist tool and DAs to support patient decision-making about CHD.

2.5. Group visit

The group visits (90–120 min/visit) included four to six patients, and were conducted by the RA and PI (AO). The group visit didactic content included: 1) introduction to CHD and lifestyle changes, 2) secondary prevention and living with CHD, 3) purpose and side effects of cardiac medications. The ADA/ACP Booklet “Living with Diabetes” was reviewed to set goals with diabetic patients. The program focused on patient communication skills related to engagement, SDM, activation and empowerment consistent to the provider intervention skills (Dwamena et al., 2009; Roter, 1977).

2.6. Clinic visit

The Office-GAP checklist was used to stimulate SDM, aid communication and impact the process of care by providing a systematic list of evidence-based medications and interventions for patient and provider to review together. The Office-GAP checklist was the core SDM tool. It was completed in *real time* by the physician and patient at two separate office visits (at 3 and 6 months). For each guideline-based item in the list, the physician discussed with the patient and checked, **Yes** (if patient was on the medication or lifestyle activity), or **No** or **Does not Apply to me because...** (ineligible for the medication, had a contraindication, or unwillingness due to side effect concerns). The Office-GAP checklist also stated the next follow-up details. At the end of the visit the physician and patient signed the checklist form to confirm that both of them have discussed all the items. A copy of the checklist went to the medical record and a copy was given to the patient.

3. Measures

3.1. Intervention feasibility

Evaluation of tool utilization rates by providers, office staff and patients. Patient measures included attendance at group visits and follow up appointments. Physician measures included Office-GAP tool utilization rate as documented in the medical record (presence of the Office-GAP checklist signed by both the provider and patient during each visit).

3.2. Medication use

Rates of using aspirin, beta-blocker, ACEI or ARBs, and cholesterol treatment were obtained at baseline, 3, 6 and 12 months as primary endpoints. The medication use measure is fundamentally a measure of both physicians' prescribing and patients' filling the prescription. Medication use was assessed by self-report at each visit and verified by patients bringing in all active medications. Only medications both prescribed by the physician and obtained by the patient were included in the analysis.

4. Data collection

Data were collected from survey forms completed by patients during the group visit and office visits. Chart abstractions were performed by trained RAs according to a predefined standardized data collection sheet. Patient race was self-reported. The project field manager continued to sample each reviewer's charts to maintain quality control. Reliability $\geq 98\%$ was maintained throughout.

5. Statistical analysis

t-Tests and chi-square tests were performed to examine differences in baseline characteristics between the Office-GAP intervention and the control groups. Because of the longitudinal nature of the study, correlated data analyses using a generalized estimating equations (GEE) model (Liang, 1986) were conducted to describe the profile of medication use across time, taking into account potential predictors. The model was used to examine change from baseline in the proportion of eligible patients using aspirin and/or clopidogrel, angiotensin converting enzyme inhibitors or angiotensin receptor blockers (ACEIs or ARBs), beta-blockers and statins at 3 months, 6 months and 12 months, both for the control and the intervention groups. Only medication eligible patients were included in the analysis for specific adherence, resulting in different numbers of patients in each model (Medication eligibility criteria: Supplementary Table B). Extending our statistical analysis for medication use, we created a global medication adherence measure based on the following algorithm: a variable that equals to the adherence for ACEI if the person was eligible for ACEI, else equals to the adherence for aspirin; else equals to the adherence for statin; and else equals the adherence for beta-blocker. In these analyses, the basic model imposed no linear structure of the time effects on the log-odds of medication use, rather treated time as a categorical variable. Hence the intervention effects (Office-GAP versus Control) were assessed using interactions between the intervention group indicator and time.

Analysis was conducted using a balancing strategy based on the propensity score-PS method (Austin, 2011). The propensity score (probability of being on the Office-GAP arm) was estimated using a logistic regression model with potential confounders. We controlled for patient's age, race, immigration status, gender, Body Mass Index (BMI), smoking status, depression, primary insurance, burden of disease (Charlson Index) and cardiologist visit. A sensitivity analysis based on three PS adjustment methods was conducted; i) treating the PS as covariate in a covariance model, ii) stratifying the patients in quintiles of PS, and iii) weighing patients by $1/PS$ for the GAP arm and $1/[1-PS]$ for the control arm, in the longitudinal data analyses. Because all these

adjusted longitudinal data analyses gave consistent results, only results generated from the inverse PS weight approach are reported. Finally, longitudinal data analyses were conducted to determine the predictors of medication use. A p-value of <0.05 is considered statistically significant in all analyses. All analyses were performed using SAS version 9.3 (SAS Institute).

6. Results

6.1. Patient characteristics

Of the 464 eligible patients, 317 patients consented to participate in the program. Reasons for non-participation included, refusal to participate, did not show up for the group visit, inability to be contacted for scheduling for group visit because their phones were disconnected. Seventy-six patients were excluded (Olomu et al., 2016). Average age was 55.0 (SD 10.95) years, with BMI of 32.39 (SD 8.51). Approximately, 57% were females. Blacks and Whites were equal in number (38.2%); Asian 13%; Hispanic 8.4% and 2% patients were from other races. 41.2% had Medicaid, followed by Ingham Health Plan (40%); Medicare 25.2% and others 14.7%. (Ingham Health Plan is a local county-based public plan that covers office visits and limited medication coverage.) There were 88.8% patients with a history of DM, 74.9% with HTN, 57.6% with

Depression, and 16% with CHD. Approximately 73.6% of the patients were moderately to severely ill based on Charlson Index score indicating substantial risk of mortality within the next 10 years for a typical patient (Charlson et al., 1987) and 35.1% were current smokers.

Table 1 show the baseline characteristics of the 243 patients enrolled in intervention and control arms. There were no statistical differences in demographic and clinical characteristic between the intervention and control arms except for race, immigrant status, type of insurance and prevalence of depression.

6.2. Intervention feasibility and program fidelity

All providers and staff attended the 90-min physician training. Among the 243 patients who attended the first 90-min group visits, 87.1% completed their first Office-GAP provider visit in the intervention arm and similarly 89.3% completed this visit in the control arm; 81.9% completed their second (final) visit in the intervention arm, and 88.4% did in the control arm. The Office-GAP tool was found completed in the medical record 98.7% of the time.

6.3. Medication use and predictors of medication use

Table 2 demonstrates the change from baseline for each medication, and show that use of each medication improved in the intervention group. We compare this to the control group and present a ratio of the OR (as labeled in the table) to show that the intervention is superior to the control. ACEIs or ARBs improved at 3 months (OR 1.82, 95% CI = 1.07; 3.10, $p < 0.03$) and 6 months (OR 2.10, 95% CI = 1.32; 3.33, $p < 0.01$). Statin use improved at 3 months (OR 2.00, 95% CI = 1.22; 3.27, $p < 0.01$) and 6 months (OR 3.05, 95% CI = 1.72; 5.43 $p < 0.01$). Aspirin and/or clopidogrel improved at 3 months (OR 1.59, 95% CI = 1.02; 2.48, $p < 0.03$), 6 months (OR 3.67, 95% CI = 1.67; 8.08, $p < 0.01$), and 12 months (OR 2.64, 95% CI = 1.36; 5.10, $p < 0.01$). In the control arm, only aspirin and/or Plavix use was significant at 12 months (OR 1.31, 95% CI = 1.00; 1.73, $p = 0.05$). Compared to the control, the

Table 1

Table of demographics for the intervention and control groups in Federally Qualified Healthcare Centers.

		Intervention (n = 120)		Control (n = 123)		p-Value
		Mean	SD	Mean	SD	
Age (years)		56.15	10.17	53.84	11.59	0.1049
BMI		32.60	8.57	32.18	8.49	0.7140
		N	%	N	%	
Gender	120			123		0.8678
Males		52	43.33	52	42.28	
Females		68	56.67	71	57.72	
Race	117			121		<0.0001
White		40	34.19	51	42.15	
Black		60	51.28	31	25.62	
Asian		3	2.56	28	23.14	
Hispanic		12	10.26	8	6.61	
Others		2	1.71	3	2.48	
Smokers	119			123		0.1611
Smokers		47	39.50	38	30.89	
Non-smokers		72	60.50	85	69.11	
Immigrant	111			120		<0.0001
Non-immigrant		102	91.89	70	58.33	
Immigrant		9	8.11	50	41.67	
Insurance (multiple-choice)	117			121		
Medicaid		40	34.19	58	47.93	0.0312
Medicare		36	30.77	24	19.83	0.0521
Ingham Health Plan		50	42.74	45	37.19	0.3825
Others		10	8.55	25	20.66	0.0078
PMH (multiple-choice)	120			123		
Hypertension		95	79.17	87	70.73	0.1295
High cholesterol		74	61.67	66	53.66	0.2066
Depression		58	48.33	37	30.08	0.0036
Asthma		15	12.50	12	9.76	0.4962
Stroke		8	6.67	9	7.32	0.8425
Congestive heart failure		8	6.67	7	5.69	0.7520
Cancer		14	11.67	10	8.13	0.3556
PVD		7	5.83	10	8.13	0.4828
CAD		24	20.00	15	12.20	0.0975
Charlson Index (CI)	120			122		0.1130
Mildly ill ($1 \leq CI \leq 2$)		25	20.83	39	31.97	
Moderately ill ($3 \leq CI \leq 4$)		64	53.33	60	49.18	
Severely ill ($5 \leq CI$)		31	25.83	23	18.85	
Diabetes	119			122		0.1735
With diabetes		109	91.60	105	86.07	

Bold data indicates significant at (P 0.05) values.

Table 2

Adjusted Odds Ratios, [95% CI], and p-values for medication use at follow-up visits compared to baseline.

	Intervention (Office-GAP)	Control	Ratio of ORs: Office-GAP/control
ACEI ^a /ARB ^b use			
3 months	1.82 [†] [1.07, 3.10]	0.97 [0.82, 1.15]	1.88 [†] [1.07, 3.30]
6 months	2.10 [*] [1.32, 3.33]	0.78 [0.61, 1.01]	2.68 [*] [1.58, 4.54]
12 months	1.38 [0.30, 2.10]	1.10 [0.23, 1.65]	1.25 [0.69, 2.26]
Statin use			
3 months	2.00 [*] [1.22, 3.27]	1.14 [0.87, 1.52]	1.75 [0.99, 3.08]
6 months	3.05 [*] [1.72, 5.43]	1.16 [0.76, 1.75]	2.64 [*] [1.30, 5.38]
12 months	1.69 [0.95, 3.02]	1.26 [0.76, 2.09]	1.35 [0.62, 2.91]
Aspirin use			
3 months	1.59 [†] [1.02, 2.48]	1.07 [0.95, 1.20]	1.50 [0.95, 2.37]
6 months	3.67 [*] [1.67, 8.08]	1.07 [0.95, 1.20]	3.44 [*] [1.40, 7.65]
12 months	2.64 [*] [1.36, 5.10]	1.31 [1.00, 1.73]	2.01 [0.98, 4.11]
Beta-blocker use			
3 months	1.48 [0.86, 2.53]	1.22 [0.92, 1.61]	1.21 [0.66, 2.22]
6 months	1.28 [0.79, 2.07]	1.14 [0.74, 1.73]	1.12 [0.59, 2.13]
12 months	1.34 [0.80, 2.24]	1.20 [0.69, 2.09]	1.11 [0.53, 2.36]
Global medication adherence			
3 months	1.73 [†] [1.04, 2.87]	0.97 [0.84, 1.11]	1.79 [†] [1.06, 3.03]
6 months	1.97 [*] [1.26, 3.06]	0.81 [0.66, 1.00]	2.43 [*] [1.49, 3.97]
12 months	1.35 [0.90, 2.02]	1.08 [0.77, 1.52]	1.25 [0.74, 2.11]

Adjusted for hypertension, diabetes mellitus, and variables in the propensity score.

* p-Value < 0.01.

† p-Value < 0.05.

^a ACEI: angiotensin converting enzyme inhibitor.

^b ARB: angiotensin receptor blocker.

intervention arm significantly improved medication use from baseline over time: ACEIs or ARBs at 3 months (OR 1.88, 95% CI = 1.07; 3.30, $p < 0.03$), 6 months (OR 2.68, 95% CI = 1.58; 4.54; $p < 0.01$); statin at 3 months (OR 1.75, 95% CI = 0.99; 3.08; $p < 0.05$), 6 months (OR 2.64, 95% CI = 1.30; 5.38; $p < 0.01$), Aspirin and/or clopidogrel at 6 months (OR 3.44, 95% CI = 1.40; 7.65; $p < 0.01$). There was no change in the use of beta-blockers in either the intervention or the control arm (Supplementary Table C). The rate of medication adherence improved by the Office-GAP intervention is reflective of improvement in the physician's prescribing behavior as shown by increase in the rate of medication prescription pre-and post-intervention as obtained from chart abstraction.

Results of the global medication adherence analysis revealed that the Office-GAP program significantly improved global medication adherence from baseline to follow-up compared to control (p -value < 0.001). Specifically, the intervention significantly improved global medication adherence from baseline compared to control at 3 months (OR 1.79, 95% CI = 1.06, 3.03; p -value = 0.03) and 6 months (OR 2.43, 95% CI = 1.49; 3.97; p -value < 0.01). The difference did not reach statistical significance at 12 months (OR 1.25, 95% CI = 0.74, 2.11; p -value < 0.41). The analysis is adjusted for DM, HTN and the potential confounders used in the propensity scores. Our results further revealed HTN as the only predictor for aspirin use. However, older age, female gender and black race predicted the use of statins. Presence of the Office-GAP intervention and HTN predicted the use of ACEI or ARBs. The Office-GAP intervention, older age, history of CAD, HTN and having insurance other than the Ingham Health Plan predicted the use of beta-blockers. Finally, global medication adherence was predicted only by the Office-GAP intervention and history of HTN (Table 3).

7. Discussion

Feasibility of the Office-GAP program in the FQHC settings was established. The Office-GAP Program led to the significantly increased use, relative to the control, of ACEI or ARBs, statins and aspirin in patients with DM, CHD or both in this low-income population. There was no change in the use of beta-blockers in either the intervention and control arms. However, there was a trend toward a higher use of beta-blockers at 3 months (47.6%), 6 months (59.5%) and 12 months (50.0%) compared to baseline use (46.5%) in the intervention arm. Medication use in the study was in accordance to AHA/ACCF and ADA guideline-based care for secondary prevention of heart disease in patients with diabetes and CHD. The novel Office-GAP tool was found to be almost universally used in this study. This multi-faceted intervention had two characteristics not frequently found in other SDM and patient activation interventions. One is that the tools were simple and delivered by providers and office staff. The second is the team-based approach; the physician and patient interventions designed to be parallel in Office-GAP program supported the therapeutic partnership from both perspectives, and put patients and providers on the same page. The program content in the group visit included discussion of the purpose and side effects of medications. The one-page Office-GAP checklist provided educational content and structures the clinical encounter. It enabled physicians to systematically review evidence-based care options for every patient during each encounter. This approach has been advocated but infrequently implemented in clinical practice (Roter & Larson, 2001). Empowering patients to interact with health care providers and promoting engagement have been described as important considerations in improving uptake and adherence to medications (Carman

Table 3
Odds Ratio [95% CI] for predictors of medication use over time.

	Aspirin	Statin	ACEI/ARB	Beta-blocker	"Global" medication adherence
3 months vs baseline	1.18 [0.89, 1.55]	1.58 [‡] [1.16, 2.16]	1.33 [0.98, 1.80]	1.60 [0.96, 2.66]	1.26 [0.96, 1.65]
6 months vs baseline	1.70 [‡] [1.23, 2.36]	1.74 [‡] [1.18, 2.56]	1.17 [0.86, 1.60]	1.39 [0.82, 2.33]	1.15 [0.87, 1.51]
12 months vs baseline	1.90 [‡] [1.24, 2.91]	1.32 [0.83, 2.09]	1.18 [0.82, 1.70]	0.96 [0.49, 1.86]	1.17 [0.84, 1.62]
GAP vs control	11.18 [‡] [4.63, 27.03]	1.35 [0.62, 2.94]	1.92 [*] [1.03, 3.63]	0.16 [*] [0.04, 0.66]	2.34 [‡] [1.28, 4.30]
(Age + 1) vs age	1.00 [0.95, 1.05]	1.05 [*] [1.00, 1.10]	1.01 [0.97, 1.04]	1.12 [‡] [1.04, 1.21]	1.00 [0.98, 1.03]
Female vs male	0.93 [0.45, 1.95]	2.29 [*] [1.03, 5.08]	0.64 [0.33, 1.21]	0.48 [0.14, 1.58]	0.74 [0.40, 1.35]
Asian vs White	1.43 [0.45, 4.54]	1.15 [0.28, 4.66]	0.61 [0.23, 1.57]	0.38 [0.06, 2.36]	0.53 [0.21, 1.30]
Black vs White	1.19 [0.49, 2.92]	3.04 [‡] [1.37, 6.73]	1.07 [0.55, 2.08]	3.85 [0.81, 18.35]	1.04 [0.55, 1.97]
Other vs White	0.63 [0.19, 2.12]	2.17 [0.44, 10.76]	2.33 [0.53, 10.24]	3.48 [0.57, 21.41]	2.02 [0.56, 7.28]
CAD vs no CAD	3.07 [0.98, 9.65]	1.83 [0.63, 5.31]	0.78 [0.33, 1.84]	11.06 [‡] [2.50, 48.74]	0.63 [0.28, 1.45]
No IHP vs IHP	2.17 [0.66, 7.06]	1.06 [0.40, 2.79]	1.30 [0.62, 2.73]	5.51 [*] [1.34, 22.61]	1.27 [0.63, 2.56]
No Medicare vs Medicare	0.88 [0.31, 2.46]	1.42 [0.54, 3.66]	0.88 [0.41, 1.89]	1.26 [0.28, 5.73]	0.83 [0.40, 1.74]
No Medicaid vs Medicaid	2.33 [0.88, 6.18]	1.19 [0.48, 2.91]	1.18 [0.57, 2.39]	1.35 [0.43, 4.30]	1.30 [0.66, 2.56]
HTN vs no HTN	4.08 [‡] [1.53, 10.87]	1.58 [0.64, 3.89]	7.38 [‡] [3.65, 14.93]	4.99 [‡] [1.51, 16.49]	5.62 [‡] [2.82, 11.19]

ACEI: angiotensin converting enzyme inhibitor.

ARB: angiotensin receptor blocker.

IHP: Ingham Health Plan insurance.

CAD: coronary artery disease.

HTN: hypertension.

GAP: Guidelines Applied to Practice.

Adjusted for hypertension, diabetes mellitus, and variables in the propensity score.

[‡] p -Value < 0.01 .

^{*} p -Value < 0.05 .

et al., 2013; Koh et al., 2013). A growing body of evidence suggests that patient engagement can lead to better health outcomes, contributes to improvement in quality and patient safety (Coulter & Ellins, 2007), and helps control healthcare costs (Charmel & Frampton, 2008). Previous studies have rarely shown an impact of communication skills interventions on patient behavior (Dwamena et al., 2012). Our results, however, are consistent with the findings of Cooper et al. (2011) who showed that the greatest improvements in BP control were seen among patients who received coaching by community health workers and among those whose physicians also received patient-centered communication skill training. We showed improved physician prescribing behavior and patient follow-through. Based on prior research in secondary prevention, it should be expected that sustained improvement in medication use and lifestyle will lead to improved cardiovascular outcomes (Eagle et al., 2005). The importance of guideline adherence is underscored by the mortality benefit that can be achieved by participants in these programs (Eagle et al., 2005). We studied minority and low-income populations who are unlikely to be able to afford the cost of medications without insurance coverage. Availability of insurance coverage in Medicaid Expansion states under the Affordable Care Act should improve and sustain access to these medications.

Our study has certain limitations. Office-GAP implementation was tested in two small cohorts at FQHCs and not in a randomized controlled trial, limiting the generalizability of our findings to other health care settings. The educational intervention exposure for physicians was limited to a one-time administration, and may degrade over time. However, Office-GAP tools reinforced SDM in the follow-up interactions. Since this is an integrated model, we are unable to disentangle the effects of the provider training and the patient training to explain our results. The increase in medication use may reflect more effective physician prescribing and communication practices, as well as more effective patient communication and activation. The study has several strengths. We believe that the Office-GAP initiative may provide the foundation for future initiatives and that it is unique in several ways. First, the tools reminded physicians, nurses and patients of the key goals of therapy in *real time* and in follow-up office visits. Office-GAP strengthened SDM and resulted in improved medication use in an underserved population not characterized by high engagement at baseline. Second, the tools' design was very simple and easy to use at the point of care. Third, all the physicians and practice staff were involved in the training and implementation of the tools and assisted in identifying the barriers to successful implementation, a strategy previously proven to be effective in influencing physician behavior.

8. Conclusion

Feasibility of the Office-GAP program in the FQHC setting was established. This physician-patient engagement program led to increased use of guideline-based medications for secondary CHD prevention in underserved populations. The Office-GAP program is a brief, efficient platform for delivering patient and provider education in SDM and could serve as a model for implementing guideline-based care for other chronic diseases in outpatient settings. Further study is needed to establish reach, effectiveness, and cost-effectiveness of physician and patient interventions designed in tandem for underserved populations.

Disclosures

The authors declare that there are no conflicts of interest.

Transparency document

The Transparency document related to this article can be found in the online version.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.pmedr.2016.06.020>.

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